

ENTOMOLOGY.—*The ant larvae of the myrmicine tribes Cataulacini and Cephalotini.* GEORGE C. WHEELER and JEANETTE WHEELER, University of North Dakota. (Communicated by C. F. W. Muesebeck.)

The tribe Cataulacini consists of a single genus (*Cataulacus*), which comprises about 45 species and occurs in the Ethiopian, Malagasy, Indomalayan, and Papuan Regions, with the greatest number of species in the Ethiopian. "All the species of this genus are tree-ants, usually forming medium-sized nests in hollow twigs and stems, or more rarely under the bark. They are timid and slow-moving insects, often feigning death or dropping rapidly to the ground when disturbed." (Arnold *vide* Wheeler, 1922, p. 198.)

The Neotropical tribe Cephalotini comprises about 90 species in four genera: *Procryptocerus*, *Zacryptocerus*, *Cephalotes*, and *Paracryptocerus*. The last-named is the largest with 60 species, three of which range into the southern Nearctic in Arizona, Texas, and Florida.

The ants of these two tribes are particularly interesting because of convergence. Although they inhabit different hemispheres, they occupy similar niches, i.e., they are ecological equivalents. Both are arboreal and live in cavities in plants. "Similarity in habits has gradually resulted in a remarkable resemblance in the shape of the head and the flattened body, . . . though they are not closely related to each other" (Wheeler, 1922, p. 496).

The larvae are likewise convergent in body shape and in pilosity. The body is elongate, straight (or nearly so), and subcylindrical or subellipsoidal; hairs are mostly minute or short. Both of these characters are possibly adaptations to life in plant cavities, particularly tubular cavities of small bore. A

long larva parked parallel and close to the wall would be less of a traffic hazard than a shorter larva parked crosswise or obliquely. These same characters are to be found also in the larvae of other ants which inhabit plant cavities, notably *Azteca*, *Camponotus*, *Crematogaster*, *Leptothorax*, and the Pseudomyrmecinae. *Camponotus* larvae have a neck, but it is short, stout, and strongly curled ventrally so that the cylindricity of the profile as a whole is scarcely affected. *Leptothorax* is somewhat stouter than the others; perhaps it is only in the early stages of adaptation.

The only noteworthy larval difference between these two tribes is to be found in the dorsal uncinata hairs: those of the Cataulacini have a single stout hook at the tip; in the Cephalotini they are anchor-tipped, i.e., with two stout hooks.

One-hooked dorsal hairs occur in *Azteca* and the Pseudomyrmecinae as well as in the Cataulacini. Anchor-tipped dorsal hairs occur in *Crematogaster* and *Leptothorax* as well as in the Cephalotini, but they are also to be found in many myrmicine genera which do not inhabit plant cavities.

Tribe CATAULACINI Emery

Elongate and subellipsoidal; nearly straight; prothorax forming a very short stout neck, which is inclined ventrally to about 45°. Spiracles minute, decreasing slightly in diameter toward the posterior end. Body hairs mostly very short; single-hooked (i.e., not anchor-tipped) hairs on the dorsum. Head moderately large; clypeus bulging. Antennae minute. Head hairs minute to very short. Anterior surface of labrum with

16 minute hairs not arranged in a transverse row or band; posterior surface with about six sensilla, but apparently without spinules. Mandibles roughly trapezium-shaped in anterior view; surfaces smooth; apex forming a slender acute tooth which is curved medially; subapical portion of medial border highly variable, more or less projecting and bearing 2-5 denticles. Maxillae apparently without spinules; cardo swollen ventrolaterally, its surface roughened with bosses and minute hairs; stipes distinct, smaller, paraboloidal and smoother; palp and galea minute. Labium and hypopharynx apparently without spinules; palps minute; opening of sericteries a short transverse slit.

Genus *Cataulacus* F. Smith

Plump and nearly straight; elongate-subellipsoidal; prothorax forming a very short stout neck which is inclined ventrally to about 45°. Body hairs numerous and mostly very short, with the tip bifid or denticulate; single-hooked (i.e., not anchor-tipped) hairs on the dorsum. Head moderately large. Cranium transversely subrectangular in anterior view. Clypeus bulging. Antennae minute. Head hairs numerous; minute to very short; with the tip simple or bifid or denticulate. Labrum very thick at the base; the ventral border feebly scalloped; anterior surface with 16 minute hairs. Mandibles roughly trapezium-shaped in anterior view; the apex forming a short slender acute tooth which is curved medially, subapical portion of inner border highly variable, more or less projecting and bearing 2-5 denticles. Maxillae with the cardo swollen ventrolaterally, its surface roughened with bosses and minute hairs; stipes distinct, smaller, paraboloidal and smoother; palp minute, represented by a cluster of five sensilla; galea minute, represented by two contiguous sensilla. Labial palps minute; each represented by a cluster of five sensilla.

Cataulacus taprobanae F. Smith

Figs. 1-8

MATURE LARVA: Length about 3.7 mm. Plump and elongate-subellipsoidal; diameter greatest at the third abdominal somite; prothorax forming a very short stout neck which is inclined ventrally to about 45°; a pair of ventrolateral bosses on the prothorax. Anus posteroventral. Leg and wing vestiges present. Segmentation indistinct. Spiracles minute, decreasing slightly in diameter toward the posterior end. Integument

apparently without spinules. Body hairs numerous and uniformly distributed except at the posterior end. Of three types: (1) on all surfaces of all somites, minute to very short (0.009-0.036 mm), with bifid tip (the branches may be denticulate); (2) on the dorsal surface of all somites except the tenth abdominal, a few longer (0.045-0.063 mm), with the tip denticulate; (3) moderately long (about 0.27 mm), with tortuous shaft and a single apical hook, four in a row across the dorsum of each abdominal somite I-VI. Head moderately large; cranium transversely subrectangular in anterior view (breadth 1.6 times length); clypeus bulging. Antennae minute, each with three sensilla, each of which bears a spinule (one of the spinules very long). Head hairs numerous, minute to very short (0.009-0.036 mm), with the tip simple or bifid or denticulate. Labrum very thick at the base; breadth 1.8 times length; ventral border feebly scalloped; anterior surface with about 16 minute hairs about 0.025 mm long; on and near the ventral border are about ten sensilla; posterior surface with about six sensilla but without spinules. Mandibles moderately sclerotized; roughly trapezium-shaped in anterior view, the apex forming a slender acute tooth which is curved medially; subapical portion of inner border highly variable, more or less projecting and bearing 2-5 denticles. Maxillae with the cardo swollen ventrolaterally, its surface roughened with bosses and minute hairs; stipes distinct, smaller, paraboloidal, and smoother; palp minute, represented by a cluster of five sensilla (three bearing a spinule each); galea minute, represented by two contiguous sensilla. Labial palps minute, each represented by a cluster of five sensilla (three bearing a spinule each); an isolated sensillum medial to each palp; opening of sericteries a short transverse slit.

YOUNG LARVA: Length about 1.3 mm. Diameter nearly uniform; greatest at abdominal somites III and IV. Integument of dorsal surface of posterior somites with a few minute spinules which are isolated or in pairs. Body hairs of three types: (1) simple, minute (0.007-0.018 mm), without alveolus and articular membrane, most numerous on the anteroventral surface, decreasing posteriorly and dorsally; (2) with the tip simple or bifid-simple or bifid-denticulate, minute to short (0.003-0.07 mm), with alveolus and articular membrane, a few on each somite; (3) one-hooked hairs with tortuous shaft, long

(about 0.21 mm), four in a row across the dorsum of each abdominal somite I-V. Otherwise generally similar to the mature larva.

Material studied: 20 larvae from the Philippine Islands.

Cataulacus egenus Santschi

Apparently similar to *taprobanae* except in the following details: Body hairs longer. Antennae with two sensilla each. Breadth of labrum 2.5 times the length. (Material studied: six damaged integuments from the Congo.)

Wheeler and Bailey, 1920: "The larval stomach is voluminous and closely packed with coarse chitinous fragments of small insects... interspersed with numerous fungus spores" (p. 255). Plate 1, figure 6, portion of stomach contents showing spores. "The mandibles of the larvae... are short, broad and stout and therefore well-adapted to crushing, so that the coarse fragments may have been bitten off by the larvae from larger pieces or whole insects proffered by their worker nurses. The pieces may, however, have been cut up to a considerable extent by the workers" (p. 255).

Cataulacus horridus F. Smith

Similar to *taprobanae* except in the following details: Body hairs of three types: (1) on the ventral and lateral surfaces, minute to very short (0.009–0.027 mm), 2- to 4-branched; (2) on the dorsal surface, 0.036–0.126 mm, the longest hairs with short-bifid tip grading into multifid shorter hairs; (3) moderately long (about 0.3 mm), with tortuous shaft and a single apical hook, four in a row across the dorsum of each abdominal somite I-V. Antennae with two (rarely three) sensilla each. Mandibles with the apical tooth longer and more curved. (Material studied: five larvae from Borneo.)

Tribe CEPHALOTINI M. R. Smith
(= Cryptocerini Forel)

Elongate and subcylindrical; straight (or nearly so); no neck; head applied to the body near the anterior end. Spiracles minute, decreasing slightly in diameter toward the posterior end. Body hairs mostly short or minute; anchor-tipped hairs present. Head small; bulging anteriorly as a whole or in part. Head hairs minute or short. Labrum short and broad; with a row (or narrow band) of 6–16 conspicuous hairs across the anterior surface; posterior surface with 6–12 sensilla but apparently without

spinules. Mandibles subtriangular in anterior view; anterior surface usually produced medially into a small blade; surfaces smooth (except a few spinules in *Cephalotes*). Maxillae without spinules (except a few in *Paracryptocerus pusillus*). Labium and hypopharynx apparently without spinules. Opening of sericteries a short transverse slit.

Genus **Procryptocerus** Emery

Body hairs numerous; mostly minute; anchor-tipped hairs present. Cranium transversely subelliptical in anterior view. Head hairs few and short. Labrum trilobed. Mandibles with the apex forming a short round-pointed tooth which is slightly curved medially; anterior surface produced medially to form a rather wide blade bearing two stout teeth on its inner border. Maxillae with the apex conoidal and directed medially; palp represented by a slightly raised cluster of five sensilla; galea a short slender peg. Labium small; palps represented each by a cluster of five sensilla.

Procryptocerus pictipes Emery

Figs. 9–13

Leg vestiges present. Spiracles minute, decreasing slightly in diameter toward the posterior end. Integument with a few short rows of minute spinules on the ventral surface of the prothorax. Body hairs moderately numerous and uniformly distributed. Of three types: (1) simple, minute (0.009–0.036 mm), the most abundant type; (2) with short-bifid tip, short (0.054–0.08 mm), very few, near the anchor-tipped hairs; (3) anchor-tipped with tortuous shaft, short (about 0.11 mm), four in a row across the dorsum of each abdominal somite I-IV. Cranium transversely subelliptical (in anterior view); breadth 1.4 times length. Antennae each with three minute sensilla, each of which bears a spinule. Head hairs few, short (0.018–0.036 mm) and simple. Labrum trilobed, breadth nearly twice the length; anterior surface with about eight hairs in a narrow transverse band; on the ventral border are about six sensilla; posterior surface with eight isolated sensilla but no spinules. Mandibles short and stout, subtriangular in anterior view; apex forming a short round-pointed tooth which is slightly curved medially; anterior surface produced medially to form a rather wide blade bearing two stout teeth on its inner border. Maxillae with the apex conoidal and directed medially; palp a slightly

raised cluster of five sensilla each of which bears a spinule; galea represented by two sensilla on the end of a short slender peg. Labium small, each palp represented by a cluster of five sensilla; an isolated sensillum between each palp and the opening of the sericteries; the latter a short transverse slit. (Material studied: four damaged integuments from British Guiana.)

***Procryptocerus schmalzi* Emery**

Figs. 14-17

Generally similar to *pictipes* but differing as follows: Body hairs of two types: (1) minute (0.009-0.036 mm), bifid or multifid tip, generally distributed, stouter on the ventral surface; (2) anchor-tipped with tortuous shaft, moderately long (about 0.15 mm), four in a row across the dorsum of each abdominal somite I-V. Antennae each with two sensilla. Head hairs numerous, with denticulate tip. Labrum feebly bilobed; anterior surface of each half with five or six bifid-tipped hairs and an isolated sensillum; ventral border with a cluster of three or four sensilla on each half. (Material studied: a single damaged integument from Costa Rica.)

Genus *Zacryptocerus* Wheeler

Body hairs numerous; anchor-tipped hairs present. Cranium subpentagonal in anterior view; scarcely broader than long. Antennae small. Head hairs moderately numerous. Labrum short and very broad; ventral border nearly straight.

Mandibles curved medially; apex acute; no medial teeth. Maxillae with a lateral boss on the cardo; stipes paraboloidal; palp minute, represented by a cluster of five sensilla; galea minute, a short slender peg. Labial palps minute, each represented by a cluster of five sensilla.

***Zacryptocerus clypeatus* (Fabricius)**

Figs. 29, 30

Leg and gonopod vestiges present. Body hairs numerous; anchor-tipped hairs present. Cranium subpentagonal in anterior view, slightly broader than long. Head hairs moderately numerous. Antennae small, each with three sensilla, each of which bears a spinule. Labrum short and broad (breadth 2.5 times length), ventral border nearly straight; anterior surface with about 15 minute hairs in a narrow transverse band; 11 sensilla on or near the ventral border; posterior surface with a cluster of about a dozen sensilla. Mandibles moderately sclerotized; subtriangular in anterior view, curved medially; apex acute; anterior surface produced medially into a small blade. Cardo of each maxilla with a small but distinct lateral boss; the stipes paraboloidal; palp minute, represented by an elevated cluster of five sensilla; galea minute, a short peg bearing two apical sensilla. Labium with each palp minute and represented by a cluster of five sensilla; an isolated sensillum between each palp and the opening of the sericteries; the latter a short transverse slit. (Material studied: a single damaged integument from Brazil.)

Figs. 1-8.—*Catantolus taprobanae* F. Smith: 1, Head in anterior view, $\times 57$; 2, right antenna in anterior view, $\times 429$; 3, left mandible in anterior view, $\times 167$; 4, young larva in side view, $\times 20$; 5, body hair with denticulate tip, $\times 235$; 6, single-hooked dorsal body hair, showing two variations of the hook, $\times 235$; 7, body hair with bifid tip, $\times 235$; 8, mature larva in side view, $\times 20$.

Figs. 9-13.—*Procryptocerus pictipes* Emery: 9-11, Three types of body hairs, $\times 185$; 12, head in anterior view, $\times 76$; 13, left mandible in anterior view, shaded to show thickness, $\times 185$.

Figs. 14-17.—*Procryptocerus schmalzi* Emery: 14, Body hair with bifid tip, $\times 185$; 15, stout body hair with multifid tip, $\times 185$; 16, anchor-tipped body hair, $\times 185$; 17, left mandible in anterior view shaded to show thickness, $\times 185$.

Figs. 18-28.—*Cephalotes atratus* (Linnaeus): 18, Mature worker larva in ventral view, $\times 5$; 19, mature worker larva in side view, $\times 5$; 20, very young larva in side view, $\times 5$; 21, anchor-tipped body hair, showing tip in surface view and in edge view, $\times 95$; 22, [missing from engraving]; 23, two stout body hairs, $\times 95$; 24, slender body hair, $\times 95$; 25, head in anterior view, $\times 31$; 26, left mandible in anterior view, $\times 95$; 27, left mandible in medial view, $\times 95$; 28, left mandible in lateral view, $\times 95$.

Figs. 29, 30.—*Zacryptocerus clypeatus* (Fabricius): 29, Head in anterior view, $\times 40$; 30, left mandible in anterior view, shaded to show thickness, $\times 95$.

Figs. 31-38.—*Paracryptocerus minutus* (Fabricius): 31, Head in anterior view, $\times 52$; 32, head in side view, $\times 52$; 33 and 34, two types of body hairs, $\times 185$; 35, left mandible in anterior view, $\times 185$; 36, first (?) instar larva in side view, $\times 10$; 37, mature larva in ventral view, $\times 10$; 38, mature larva in side view, $\times 10$.

Figs. 39-40.—*Paracryptocerus (Harnedia) wheeleri* (Forel): 39, Right maxillary palp in lateral view, $\times 370$; 40, left mandible in anterior view, shaded to show thickness, $\times 185$.

Fig. 41.—*Paracryptocerus pusillus* (Klug): 41, Head in side view, $\times 44$.

Figs. 42-44.—*Paracryptocerus (Harnedia) umbraculatus* (Fabricius): 42-44, Three types of body hairs, $\times 185$.

Figs. 45-46.—*Paracryptocerus multispinus* (Emery): 45, Head in anterior view, $\times 44$; 46, left maxilla in anterior view, $\times 185$.

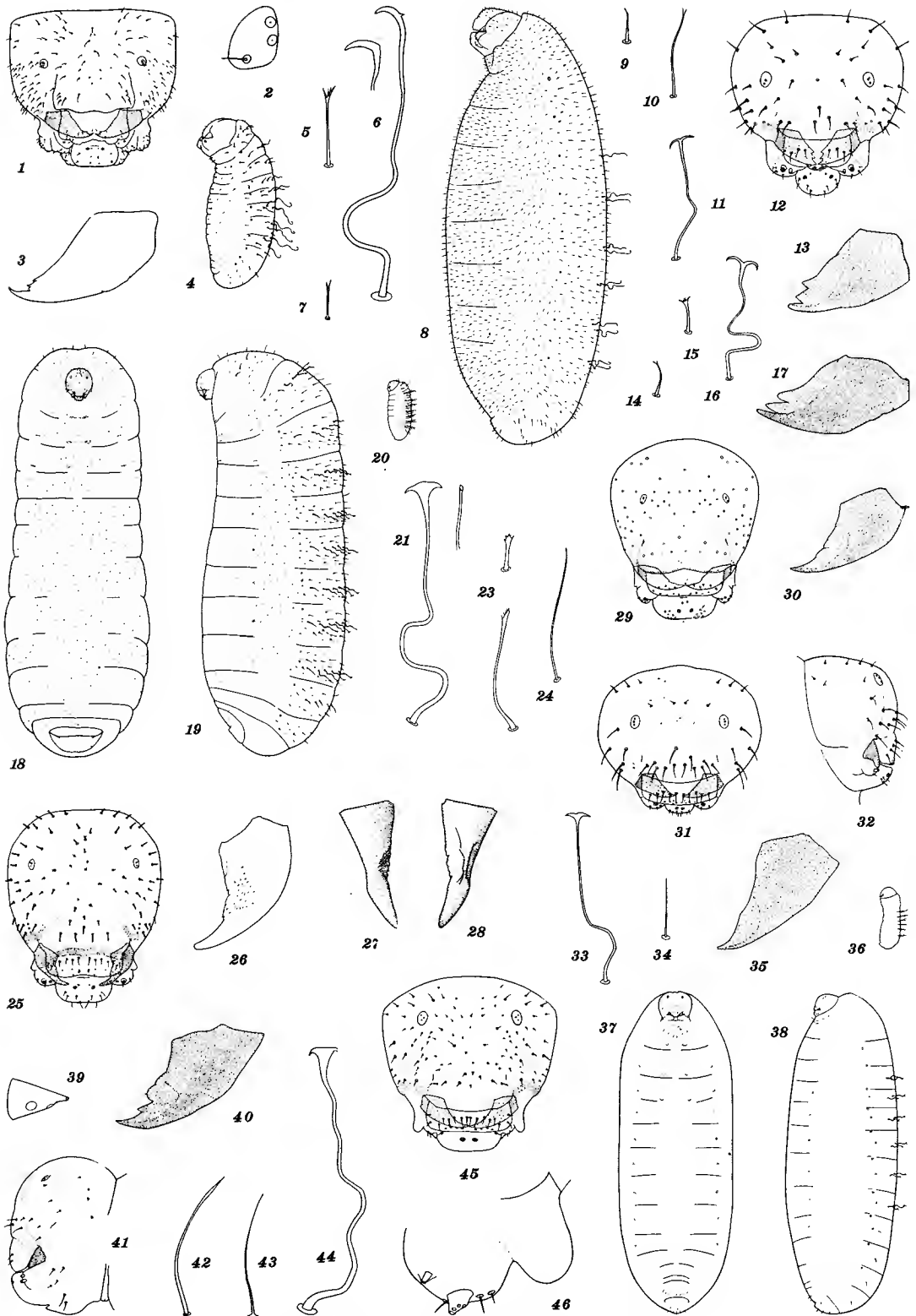


FIG. 1-46.—(See opposite page for legend).

Genus *Cephalotes* Latreille

Moderately stout and nearly straight; subcylindrical; no neck; head ventral, near the anterior end. Body hairs moderately numerous, minute to short; anchor-tipped hairs present. Head small. Cranium vaguely subhexagonal in anterior view; scarcely broader than long. Antennae small. Head hairs moderately numerous and very short. Labrum very short and broad, with the ventral border feebly impressed at the middle. Mandibles curved medially; apex round-pointed and rather stout; inner border erose; anterior surface with a few minute spinules. Maxillae with a lateral boss on the cardo; stipes paraboloidal; palp a peg; galea a minute slender peg. Labial palps minute, each a slightly raised cluster of five sensilla.

Cephalotes atratus (Linnaeus)

Figs. 18-28

MATURE WORKER LARVA: Length (straight) about 11 mm; head to anus through spiracles about 13 mm. Body moderately stout and nearly straight; subcylindrical; diameter greatest at abdominal somite IV, decreasing slightly to the anterior end and more rapidly to the posterior end which is narrowly rounded; anterior end formed from the dorsa of prothorax and mesothorax. Head ventral, near the anterior end. Anus posteroventral. Leg, wing, and gonopod vestiges present. Spiracles minute, decreasing slightly in diameter toward the posterior end. Integument of the ventral surface of the thorax with minute spinules in rather numerous short transverse rows. Integumentary structures of unknown nature and function on the lateral surfaces of abdominal somites IV-I. Body hairs moderately numerous. Of four types: (1) simple, minute (0.006-0.018 mm), on the ventral and lateral surfaces; grading into (2) stout and short (0.018-0.198 mm), with frayed tip, a few near the spiracles and on the dorsal surface of the prothorax and of the seventh abdominal somite; (3) slender and short (0.027-0.28 mm), with the tip simple or frayed, a few on the dorsal surfaces of thorax and first six abdominal somites; (4) anchor-tipped with tortuous shaft, relatively short (about 0.45 mm), 4-8 in a row across the dorsum of the mesothorax, eight (sometimes nine) in a row across the dorsa of the metathorax and each abdominal somite I-VI. Head small; cranium vaguely subhexagonal in anterior view, slightly broader than long.

Antennae small, each with three minute sensilla, each of which bears a spinule. Head hairs moderately numerous, very short (0.018-0.046 mm), stout, with frayed tip. Labrum short and very broad (breadth twice the length), ventral border feebly impressed at the middle; anterior surface with a transverse row of 11-14 short simple or bifid-tipped hairs and (ventral to the hairs) 10 or 11 minute sensilla; posterior surface with about 10 isolated sensilla. Mandibles moderately sclerotized; subtriangular in anterior view, curved medially; inner border erose; anterior surface with a few minute spinules. Cardo of each maxilla with a small but distinct lateral boss; the stipes paraboloidal; palp a peg bearing five apical sensilla; galea minute, a short peg bearing two apical sensilla. Each labial palp minute, represented by a slightly raised cluster of five sensilla; an isolated sensillum between each palp and the opening of the sericteries; the latter a short transverse slit.

QUEEN LARVA: Length (straight) about 13 mm; head to anus through spiracles about 14 mm. Body a trifle stouter. Otherwise as in the worker larva.

YOUNG LARVA: Length about 3 mm. Head on the anterior end and of approximately the same diameter as the thorax. Otherwise as in the mature worker larva.

VERY YOUNG LARVA: Length about 1.5 mm. Head on the anterior end and of approximately the same diameter as the thorax. Body hairs shorter. Integument spinulose on the dorsal surface of the posterior somites and on the ventral surface of the thorax, the spinules minute and in short transverse rows. Head hairs slender, mostly simple (a few with short-bifid tip), 0.009-0.09 mm. Mandibles with the base inflated; apex slender, conoidal and curved medially. Maxillary and labial palps represented by a loose cluster of five sensilla each, galea by two sensilla.

Material studied: numerous larvae from British Guiana, courtesy of Dr. N. A. Weber.

Eidmann, 1936: "Die Larve besitzt eine sehr grosse Kopfkapsel, die durch dunkelbraune Verstärkungsleisten an den Rändern und der Basis der Mandibel besonders auffällt. Auch die Mundteile sind teilweise gebräunt. Die Mandibel sind kräftig und spitz und können hinter der stark entwickelten Oberlippe verborgen werden. Ferner besitzt die Larve 8 Oncochaeten-Reihen auf der Dorsalseite des Metathorax und des 1.-7.

Abdominalsegmentes. Die Oncochaeten sind stark gekrümmt, kräftig und laufen in ankerförmig gegabelte Spitzen aus. Durch ihre dunkelbraune Färbung heben sie sich von dem weissen Larvenkörper sehr gut ab. Auch am toten Material bewirken sie noch ein festes Aneinanderhaften der Larven zu grösseren Ballen" (pp. 82-83). Plate I, figure VIII: head in anterior view; a row of anchor-tipped hairs; a single anchor-tipped hair greatly enlarged.

Wheeler, G. C., 1938, p. 141: wing rudiments occur in both worker and male larvae.

Genus **Paracryptocerus** Emery
(= *Cryptocerus* of authors)

Plump, straight, and elongate-subellipsoidal; no neck; head applied to the anteroventral surface. Body hairs very few to numerous; minute to short; anchor-tipped hairs present. Head small; bulging anteriorly, as a whole or in part. Head hairs few to numerous; minute to short. Labrum very short and broad, ventral border slightly convex. Mandibles curved medially; apex acute; a short narrow blade projecting medially from the anterior surface; inner border without teeth (but with denticles in some species). Galea minute or small.

Subgenus **Paracryptocerus** Emery
[= *Cryptocerus* (*Paracryptocerus*)]

Paracryptocerus minutus (Fabricius)

Figs. 31-38

MATURE WORKER LARVA: Length about 4.8 mm. Plump, straight and elongate-subellipsoidal; diameter greatest at abdominal somites III and IV, decreasing gradually toward either end; no neck; head applied to the anteroventral surface. Anus posteroventral. Leg vestiges conspicuous, wing vestiges present. Segmentation indistinct. Spiracles minute, diameter decreasing slightly toward the posterior end. Integument of entire body with rather long transverse rows of minute spinules. Integumentary structures of unknown nature and function on the lateral surfaces of abdominal somites I-VI. Body nearly naked. Body hairs of two types: (1) simple, minute to short (0.009-0.054 mm), longest and most numerous on the prothorax and around the anus; (2) anchor-tipped with tortuous shaft, short (about 0.18 mm), four in a row across the dorsum of the metathorax and of each abdominal somite I-V. Head small; frons bulging; cranium transversely subelliptical in anterior view

(breadth 1.4 times length). Antennae each with three sensilla, each of which bears a spinule. Head hairs few, short (0.009-0.036 mm) and simple. Labrum short and broad (breadth 2.8 times length); ventral border slightly convex; anterior surface with about 11 conspicuous hairs in a narrow transverse band and (ventral to the hairs) 10 sensilla; posterior surface with eight isolated sensilla. Mandibles small; moderately sclerotized; subtriangular in anterior view, curved medially; apex acute; a short narrow blade projecting medially from the anterior surface. Maxillae small, paraboloidal; palp represented by a cluster of two large and two or three small sensilla; galea minute, represented by two contiguous sensilla. Labium small; palps minute, each represented by a cluster of five sensilla; opening of sericteries a short transverse slit.

YOUNG LARVA: Length about 1.9 mm. Body nearly straight; slightly swollen at the third abdominal somite. Head on the anterior end and of nearly the same diameter as the prothorax. Integumentary spinules more conspicuous. Otherwise similar to the mature larva.

FIRST (?) INSTAR LARVA: Length about 0.8 mm. Subcylindrical; head on the anterior end and of nearly the same diameter as the thorax. Spiracles minute. Body hairs shorter. Integumentary spinules restricted to the ventral surface of the thorax. Head nearly naked.

Material studied: numerous larvae from British Guiana, Guatemala, and the Panama Canal Zone.

Wheeler and Bailey, 1920, p. 255: "The larval stomach is voluminous and closely packed with coarse chitinous fragments of small insects. . . . The mandibles of the larvae . . . are short, broad and stout and therefore well-adapted to crushing, so that the coarse fragments may have been bitten off by the larvae from larger pieces or whole insects proffered by their worker nurses. The pieces may, however, have been cut up to a considerable extent by the workers."

Paracryptocerus multispinus (Emery)

Figs. 45, 46

Integument of body apparently without spinules. Spiracles small, diameter decreasing posteriorly. Body hairs numerous. Of three types: (1) minute (0.006-0.009 mm), with the tip simple or divided, without alveolus or articular membrane, generally distributed, the

most abundant type; (2) short (0.018–0.15 mm), with the tip bifid, less abundant than Type 1, generally distributed; (3) anchor-tipped with tortuous shaft, moderately long (about 0.32 mm), five or six in a row across the dorsum of the metathorax and of each abdominal somite I–VI. Cranium subtrapezoidal (in anterior view), with all corners rounded; breadth 1.3 times length; integument spinulose, the spinules minute and in numerous short transverse rows; frons and clypeus bulging. Antennae conspicuous and rather large, each with three sensilla, each of which bears a spinule. Head hairs numerous, minute to short (0.009–0.054 mm), stout with frayed tip. Labrum subrectangular, slightly narrowed dorsally, ventral corners rounded, short and broad (breadth 2.5 times length); anterior surface with about 16 hairs in a transverse band and (ventral to the hairs) 10 sensilla; posterior surface with eight isolated sensilla. Mandibles moderately sclerotized, subtriangular in anterior view and curved medially, a narrow short blade projects medially from the anterior surface. Cardo of each maxilla with a distinct lateral boss; the stipes lobose; palp small and conical, bearing five sensilla; galea minute, a short slender peg bearing two sensilla. Labial palps each represented by a slightly elevated cluster of five sensilla; opening of sericteries a short transverse slit. (Material studied: 13 damaged integuments from Guatemala.)

Wheeler and Bailey, 1920, p. 255: The quotation above under *minutus* was also applied to *multispinus*.

Paracryptocerus pusillus (Klug)

Fig. 41

Similar to *minutus*, except in the following characters: Body hairs somewhat longer. Anchor-tipped hairs two on the metathorax and four to six each on abdominal somites I–V. Head thick throughout. Antennae minute. Anterior surface of labrum with 6–9 hairs; posterior surface with 6–10 sensilla. Inner border of mandibular blade highly variable (smooth, erose or with two denticles). Maxillae with a few isolated spinules lateral to each palp. Labium with an isolated sensillum between each palp and the opening of the sericteries. (Material studied: four larvae from the Panama Canal Zone.)

Eidmann, 1936, p. 84: "Die Altlarven und Puppen stammen vermutlich aus einer vorwinterlichen Eiablage, die nachwinterliche Ei-

ablage des Frühjahres hatte wahrscheinlich entsprechend der geringen Zahl der Eier und Junglarven erst vor kurzem eingesetzt. Damit stimmt überein, dass sich später (4. X.) in einem anderen Nest keine Altlarven, sondern nur noch Puppen sowie zahlreiche kleine und mittelgrosse Larven vorfanden. Die Larven fielen im Gegensatz zu den *Cephalotes*-Larven durch ihren kleinen Kopf und die geringe Ausstattung mit Oncochaeten auf. Von den letzteren fanden sich auf den 7 damit versehenen Segmenten nur je 4. und zwar in symmetrischer Anordnung je 2 beiderseits der dorsalen Mittellinie."

Subgenus **Cyathomyrmex** Creighton

[= *Cryptocerus* (*Cyathocephalus* = *Cyathomyrmex*)]

Paracryptocerus (**Cyathomyrmex**) **varians** (F. Smith)

Similar to *minutus* except in the following characters: Head more ventral. Body hairs somewhat more numerous, but still sparse and mostly inconspicuous. Of three types: (1) simple, minute (0.009–0.027 mm), generally distributed; (2) with the tip divided, short (0.054–0.072 mm), few, on the dorsa of the metathorax and abdominal somite VI; (3) anchor-tipped with tortuous shaft, moderately long (about 0.18 mm), four in a row across the dorsum of each abdominal somite I–V. Clypeus bulging; cranium subtrapezoidal in anterior view, but with all corners broadly rounded; narrowed ventrally; maximum breadth 1.6 times length. Labrum with about 12 sensilla on the posterior surface. Labium with an isolated sensillum medial to each palp. (Material studied: numerous larvae from Cuba and the Bahamas.)

Wheeler and Bailey, 1920, p. 255: The quotation above under *minutus* was also applied to *varians*.

Subgenus **Harnedia** M. R. Smith

[= *Cryptocerus* (*Cryptocerus*) of authors]

Paracryptocerus (**Harnedia**) **maculatus** (F. Smith)

Similar to *minutus* except in the following details: Body hairs moderately numerous. Of three types: (1) very short (about 0.018 mm), with the tip simple or bifid, without alveolus and articular membrane, generally distributed, the most numerous type; (2) minute to short (0.009–0.072 mm), with the tip simple or bifid, with alveolus and articular membrane, most numerous on the venter of the prothorax,

scattered elsewhere; (3) short (about 0.22 mm), anchor-tipped with tortuous shaft, four in a row across the dorsum of each abdominal somite I-V. Head hairs moderately numerous, the tip simple or bifid, longer (0.018-0.054 mm). Antennae small. Anterior surface of labrum with about eight hairs; posterior surface with about a dozen sensilla. Labium with an isolated sensillum between each palp and the opening of the sericteries. (Material studied: three larvae from the Panama Canal Zone.)

Paracryptocerus (Harnedia) umbraculatus
(Fabricius)

Figs. 42-44

Apparently similar to *minutus* except in the following details: Body hairs moderately numerous. Of three types: (1) simple, slender, minute to short (0.009-0.108 mm), mostly without alveolus and articular membrane, generally distributed, the most abundant type; (2) stout, short-pointed, short (about 0.09 mm), six each on the dorsa of mesothorax and abdominal somite VII; (3) anchor-tipped with tortuous shaft, short (about 0.23 mm), 6-8 in a row across the dorsum of the metathorax and of each abdominal somite I-VI. Head hairs moderately numerous, with tip simple or bifid, longer (0.018-0.063 mm). Anterior surface of labrum with about 14 hairs. Maxillary and labial palps each a knob bearing five sensilla, one of which is elevated; an isolated sensillum medial to each

labial palp. (Material studied: six damaged integuments from British Guiana.)

Paracryptocerus (Harnedia) wheeleri
(Forel)

Figs. 39, 40

Apparently similar to *minutus* except in the following details: Body and head hairs somewhat shorter. Posterior surface of labrum with 12 sensilla. Mandibles with the apex turned medially, inner border of the blade with six denticles. Maxillary and labial palps each a subcone bearing five sensilla; an isolated sensillum between each palp and the opening of the sericteries. (Material studied: three damaged specimens from Mexico.)

Wheeler and Bailey, 1920, p. 255: The quotation above under *minutus* was also applied to *wheeleri*.

LITERATURE CITED

- EIDMANN, H. *Ökologisch-faunistische Studien an südbrasilianischen Ameisen*. Arb. Phys. Angew. Ent. Berlin-Dahlem **3**: 26-48, 81-114, 1 pl., 5 text figs. 1936.
- WHEELER, G. C. *Are ant larvae apodous?* Psyche **45**: 139-145, 2 pls. 1938.
- WHEELER, W. M., et al. *The ants collected by the American Museum Congo Expedition*. Bull. Amer. Mus. Nat. Hist. **45**: 1-1139, 45 pls., 103 text figs., 47 maps. 1922.
- WHEELER, W. M., and BAILEY, I. W. *The feeding habits of pseudomyrmecine and other ants*. Trans. Amer. Phil. Soc. (art. 4): 235-279, 5 pls., 6 text figs. 1920.